New Faculty Training Conference for Two-Year College Physics Faculty (NFTC)*
March 6-8, 2008 at Delta College, University Center, MI

Conference Leaders

Scott Schultz, Delta College, University Center, MI
Todd Leif, Cloud County Community, Concordia, KS
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This conference is designed to equip new faculty members with knowledge of active learning techniques that are both based on Physics Education Research (PER) and that have been successfully implemented at two-year colleges across the country. Led by experienced two-year college physics instructors, this conference will empower a new faculty member as they embark on the important mission of developing critical thinking skills in their students and developing the future technological workforce for this country.

The conference will start with a focus on Physics Education Research and the data that show traditional lecture-based physics classes result in relatively small gains in student conceptual understanding of the fundamental concepts of physics. Much of this will take place through an online discussion of journal articles related to the topic during January and February. Consequently, conference participants will be ready for the actual conference as they will understand why there is a need to engage students at a higher cognitive level.

At the conference, participants will be exposed to three major pedagogical initiatives in introductory physics that have improved student comprehension: Microcomputer-Based Labs (MBL), Introductory College Physics/Twenty First Century (ICP/21), and Instructional Strategies in Introductory Physics (discourse management/TIPERS). Based on their exposure the first day, participants will choose two of these areas to further explore over the next two days.

Recent PER data indicates microcomputer-based laboratory (MBL) tools coupled with an activity-based physics approach provides a better method of teaching physics by enabling the teaching/learning process to build on students' direct experiences in the physics classroom/laboratory or studio. These MBL tools give students immediate feedback by presenting data graphically in a manner that can be easily and quickly understood. The ease of data collection and presentation afforded by these tools invites students to ask, discuss, and answer their own questions. Thus, students acquire an increased competence in the use and interpretation of graphs as well as a better understanding of the physical relationships, principles, and concepts that underlie their experiences. In this hands-on workshop, participants will work in areas involving force, one-dimensional linear motion, rotation, sound, heat, electricity, magnetism, nuclear radiation, and light.

The ICP/21 curriculum was written with the technical (engineering and medical) student in mind. Each participant will work through selected modules in this new curricula that was developed by a group of two-year college physics professors led by Alexander Dickison of Seminole Community College in Sanford, Florida; Marvin Nelson of Green River Community College in Auburn, Washington; Pearly Cunningham of Community College of Alleghany County in West Mifflin, Pennsylvania; and Sherry Savrda of Seminole Community College.
Each ICP/21 module uses a series of learning cycles and incorporates many of the teaching techniques, developed by others, that are based on physics education research. Throughout the problem sets and examples in the modules, ICP/21 uses applications found in industry and medicine. The modular CD curriculum allows TYC instructors the opportunity to choose several modules from the curricula that are particularly germane for their students. Each module is activity-based and utilizes a variety of tools to better motivate the student in the learning of key physics concepts.

The Instructional Strategies in Introductory Physics presents ways that instructors can approach teaching physics. Participants will learn selected strategies and practice applying them to physical situations. Essential to creating a useful strategy is to have quality-modeling tools. As physicists we have been exposed to numerous modeling tools (equations, free-body diagrams, motion diagrams, etc.). This workshop will introduce new modeling tools and demonstrate how to use existing tools in more robust ways. Another essential component of these strategies is classroom management. Participants will experience a classroom management technique called modeling discourse management. While this classroom management style was created for a modeling curriculum, it can also be used with most PER based activities or curriculum. Modeling discourse management is an attempt to improve student-student interactions, student-instructor interactions, and classroom discussions.

At the end of the conference, participants will present rough drafts of material they have adapted/created during the three days at Delta College to use back at their home institutions. With feedback from the group, participants will revise and implement these techniques over the next 15 months. The discussion board will be available for continued networking and collaboration among participants during this time. We will have a follow-up meeting the day before the start of the National Summer Meeting for the American Association of Physics Teachers. Both meetings are in Ann Arbor, MI in July, 2009.

Through this 16 month immersion in methods to actively engage students in introductory physics, new instructors will be collaboratively working with their peers from across the country to build a successful physics program at their home institutions. This should lay the groundwork for a long and productive career for the instructor and positively impact what takes place in the classroom as they prepare students for the workforce and lifelong learning. This initial investment in a new faculty member has the potential to produce large gains in student comprehension for many years.

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